

# Regional Economic Policy Diagnosis Taking Into Account Productive Components

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**Abstract.** The article presents approaches to the interpretation of the "regional economic policy" concept in a theoretical way. A rather extensive controversy regarding this category, assessment methods, determines its versatility and capacity, indicates the presence of scientific interest in this term at this current stage of developing a scientific thought. The relevance of this article is determined by the objective features of the regional systems development. The aim of the study is the need to diagnose regional economic policy on the basis of the gross regional product. A method of correlation and regression analysis was used for this matter. The result is a regional economic policy analysis of criteria with identification of key factors influencing it, which gives a more accurate economic description of the regions. The conclusion about the influence of a number of signs on the development of administrative-territorial entities is made, on the basis of which regional authorities can plan and evaluate the development features of the subjects.

## 1. Introduction

Intraregional economic action and interregional economic interaction are organically linked with the conduct of a certain regional economic policy on federal and especially regional levels. Only with this approach is it possible to formulate a decision-making model based on a quantitative assessment of socio-economic development, which is able to generate, accumulate and effectively perceive both national and regional interests and needs, determining the development prospects of the subjects.

Regional economic policy in the context of modernizing various fields of activity is a type of an effective lever of state regulation, which, naturally, must be based on the qualitative criterial assessment of the systems under study.

The purpose of the research is the need to diagnose regional economic policy on a basis of gross regional product.

To achieve this goal it is necessary to solve a number of tasks, such as:

- to consider theoretical and methodological interpretations of the concept of «regional economic policy»;
- form a set of indicators to diagnose regional economic policy;
- build an econometric model with the ability to predict the level of GRP.

## 2. Scientific novelty

Scientific recency of the research goal lies in the formation of a criteria set that has a significant impact on economic development with the construction of a model according to the North Caucasus Federal District.

## 3. Methodology

The range of statistical indicators has a direct impact on economic policy, followed by the selection of the key ones, by means of calculation and construction of a graphical interpretation - a scatterplot.

## 4. Diagnostics of the regional economic policy and building an econometric forecasting model

Regional economic policy in modern conditions is an effective tool, a mechanism of state regulations. The author reviewed a number of scientific approaches to the interpretation of regional economic policy. Researchers Livshits A.Ya. and Novikov A.V. consider regional policy as a summation of resources that need to be effectively redistributed within the country to achieve set goals [1]. If we consider the interpretation enshrined in the Government of the Russian Federation document, then it is understood as «the system of goals and objectives of state authorities for managing political, economic and social development of the country's regions, the mechanism for their implementation» [2]. V.V. Kotilko underlines that regional economic policy is, above all, a special kind of state policy, which is carried out by special authorized institutions [3].

The second group of scientists treats regional economic policy as regulating state interactions in relation to regions, and regulating regions in relations among themselves, which ensure the interests of the state and regions. For example, scientists and geographers from St. Petersburg believe that regional policy is «a sphere of activity for managing political, economic, social and environmental development of a country in a spatial, regional aspect and reflecting both the relationship between the state and the regions and the regions among themselves» [4]. In this essence, the following wording appears to be similar: «regional policy can only be considered as such a system of intentions and actions if it implements the interests of the state in relation to the regions and the internal interests of the regions themselves by methods that take into account the nature of modern regional processes, and which does all this primarily in the structure of inter-and intraregional relations» [5].

According to A.G. Granberg, Regional Economic Policy (REP), in a general sense, is a set of tools and methods that affect the development of territories in a particular area and determine three levels of its implementation: municipal, sub-federal, and federal [6].

In these definitions, the following idea is carried out: regions, along with the state, represented by their authorities, have their own value system, their own interests, corresponding economic, political and intellectual power, the ability to implement these or other decisions independently and under their responsibility in respect of parts of the territory under their jurisdiction. However, it is impossible to make effective decisions without reliable information that quantifies phenomena, indicators that reflect key aspects of developing territories. Various approaches to the regional policy assessment, including the assessment of the regional policy effectiveness, are presented in the scientific works of T.E. Beidina [7], R.I. Ananyeva [8], E.G. Vasilyeva [9], A.N. Ostroumova [10] and other researchers.

In general, the features of regional economic policy can be described by a change in trends of the resulting macroeconomic indicator, which is most often Gross Regional Product (GRP), that characterizes the totality of goods, work, services in the region in monetary terms [11]. There are some components and tools that affect the GRP, which are at the disposal of public authorities and, some alternative ones, are reviewed and proposed by a number of researchers. Therefore, according to the author, it is possible to consider this indicator as the key to characterize the REP.

A number of indicators affecting GRP was proposed and a correlation and regression analysis of the factors was carried out, with the construction of regression models that allow further prediction of the data. This study was made in the subjects of the North Caucasus Federal District for 2016.

More indicators could be added to the ones under consideration, however, the choice focused on those that characterize the effectiveness of socioeconomic policy the best and were selected based on

the results of the correlation and regression analysis, the results of which have a close relationship with the GRP of more than 0,8 for each of the them and the level of statistical significance  $p \leq 0,05$ , which confirms the reliability of the selected criteria (table 1).

**Table 1.** Indicators characterizing / influencing REP.

Subject	Indicator and its value (for 2016)							
	GRP (million rubles)	Number of foreign citizens holding a patent for labor activity (people)	The number of employees of state authorities and local governments (people)	Expenses of consolidated budgets of the Russian Federation (million rubles)	Fixed investment (million rubles)	Research and Development Organizations	Number of researchers with scientific degrees (people)	Domestic costs of research and development (million rubles)
	$Y$	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$
A1 <sup>a</sup>	597096,7	6482	33819	96253,1	199556	45	1020	929,7
A2 <sup>b</sup>	50882,9	1437	8064	27795,4	20632	7	165	68,8
A3 <sup>c</sup>	132706,9	3234	12915	34117,4	36235	18	486	502,2
A4 <sup>d</sup>	73151,3	3312	9030	21895,9	20555	11	167	492,2
A5 <sup>e</sup>	125498,3	1614	14655	26181,4	25533	22	190	371,1
A6 <sup>f</sup>	166711,2	800	23467	71247,8	60543	8	285	218,3
A7 <sup>g</sup>	651925	5499	39129	103763,8	122949	49	1200	1815,1

<sup>a</sup> Republic of Dagestan.

<sup>b</sup> Republic of Ingushetia.

<sup>c</sup> Kabardino-Balkarian Republic.

<sup>d</sup> Karachay-Cherkessia.

<sup>e</sup> Republic of North Ossetia-Alania.,

<sup>f</sup> Chechen Republic.

<sup>g</sup> Stavropol Territory.

In order to substantiate the factors included in the econometric model, at the preliminary stage of the calculations, a pairwise correlation analysis of factor signs  $X$  was performed, which allows eliminating the quantities related to each other. Econometric analysis showed that and there is a statistically significant and strong relationship between  $X_2, X_4, X_5, X_6$  and  $X_7$ . The factors  $X_1$  and  $X_3$  are not statistically related to other factors, therefore, if according to these characteristics we get the results of the significance of the Student's statistics not exceeding the permissible limits ( $p \leq 0,05$ ), then the necessity of including them in the linear regression equation will be obvious.

Results of the regression analysis indicate the importance of Student's statistics on the factors  $X_1$  ( $p=0,0272$ ) and  $X_3$  ( $p=0,0068$ ), however, the considered features do not correlate with each other, therefore it is necessary to include both of them in the model and assess the degree of influence on the "Gross regional product". The criteria for selection is the degree of significance  $p$ . Table 2 presents the values of results of the correlation analysis.

**Table 2.** Correlation analysis results for  $X_1, X_3$  and  $Y$ .

Statistics	Value $X_1$	Value $X_3$
Multiple correlation coefficient ( $R$ )	0,8533	0,9275
Multiple determination coefficient ( $R^2$ )	0,7281	0,8602
Adjusted multiple determination coefficient	0,6737	0,8323
Fisher Criteria ( $F$ )	13,3929904	30,7803492
Significance level ( $p$ ) of Fisher statistics ( $F$ )	0,0146	0,0026
Standard assessment error	145392,58	14424,11

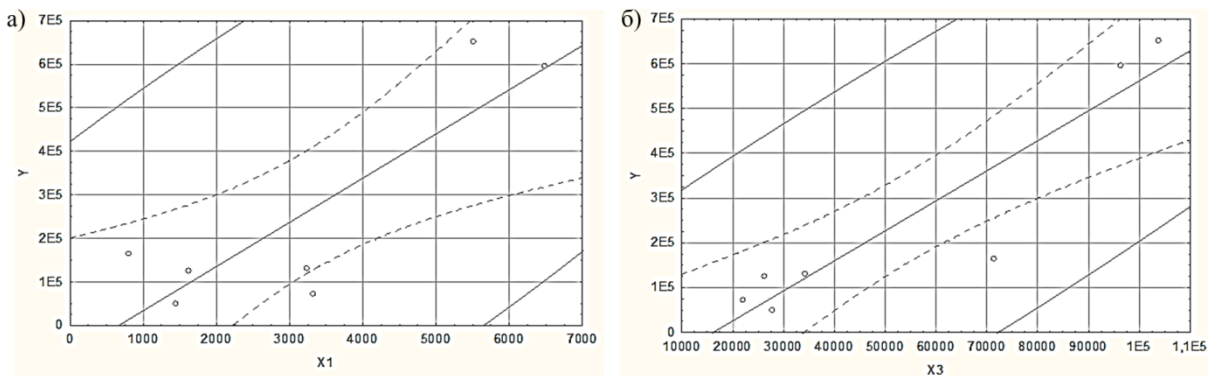
The value  $F$  of the Fisher criteria at a given level of significance  $p$  reflects how well this model explains the total variance of the dependent variable [12]. Regression coefficients are recognized as statistically significant and the equation is correct if the calculated ( $t_{calc}$ ) value  $F$  exceeds the tabular ( $t_{table}$ ) value  $t$  for a given level of significance  $p$  and  $n-k-1$  [13], degrees of freedom, which are observed in our case. The significance level of the calculated Fisher criteria for  $X_1$  ( $F = 13,39$ ) significantly exceeds the tabular ( $F = 6,61$ ), and by the factor  $X_3$  ( $F = 30,78$ ) in comparison with itself. Consequently, the variance explained is substantially larger than the unexplained, and the linear regression model is significant.

The result of the calculations performed indicates the feasibility and possibility of using the analyzed factor signs in the regression model, which affects the GRP, and therefore the effectiveness of the regional economic policy of the region. There is also a correlation between the “number of foreign citizens who have a patent for labor activity” and the GRP, which is quite logical, since additional attraction of labor, creating a finished product on the territory of the subject contributes to the whole and the growth of GRP. However, tax payments going to the budget (from the wages of employees and social funds of the employer) are paid only to people who are officially employed, therefore, it is necessary for the Federal Migration Service authorities to stop the activities of unscrupulous citizens who do not have official employment and registration. The expenses of the consolidated budgets of the constituent entities of the Russian Federation also influence the growth of the GRP, since they can be associated with supporting small and medium-sized businesses, and also finance the educational sector that provides training for competent specialists in a particular industry, which will further improve the quality of labor resources, absence of their shortage, growth of labor productivity, quality of goods, work, services and directly the growth of the rate of GRP.

Therefore, the resulting dependence can be represented as the following equation (1):

$$Y = -160125 + 51 \cdot X_1 + 5 \cdot X_3 \tag{1}$$

and graphical interpretation of the correlation is reflected in the scatterplot (Figure 1).



**Figure 1.** A graphic representation of the linear regression dependence of the GRP  $Y$  on the number of foreign citizens holding a patent for labor activity  $X_1$  and expenses of the consolidated budgets of the constituent entities of the Russian Federation  $X_3$  for 2016. a) degree of dependence of indicators on; b) degree of dependence of indicators on.

On a basis of the econometric model created (1), its validity was verified according to the data of the Stavropol Territory. For this, data on factors for 2015 were used and implemented a forecast for 2016. If the variability of the predicted value of the actual does not amount to more than 5%, then the model is recognized as correct. The calculations showed that the deviation of the predicted value

(639143) from the actual (651925) was less than two percent (1,96%), which confirms the efficiency of the proposed model.

Further, regional economic policy diagnosis was done according to the criteria «average performance»  $\bar{P}$ , by which the author understands the average value (arithmetic average) describing the degree achieving the result, taking into account the sign of completeness that is characterizing the average state of the systems at a specific point in time. Based on the definition, the formulas of the average performance in terms of indicators affecting GRP will take the form (2):

$$\bar{P}_i = \frac{\sum_{i=1}^n P_i}{n} \tag{2}$$

Where  $\bar{P}_i$  - the average performance by the relevant indicator;  $P_i$  - value of the indicator; n — the number of periods.

The author calculated the criteria  $\bar{P}$  for 7 subjects of the North Caucasus Federal District (NCFD) taking into account the indicators affecting GRP, which are presented in Table 3. Based on the table data, we conclude that the average performance  $\bar{P}$  in terms of the indicator  $X_1$  does not reach the optimum (the average value of each indicator in the North Caucasus Federal District) in the Republic of Ingushetia, North Ossetia, Alania, the Chechen and Kabardino-Balkarian Republics, since they do not exceed the average for the North Caucasus Federal District (3348,107). The performance criteria for the indicator, also for a number of subjects, leaves much to be desired and does not reach the average (Republic of Ingushetia, Kabardino-Balkarian Republic, Karachay-Cherkess Republic, Republic of North Ossetia-Alania).

**Table 3.** The results of the average performance evaluation in the NCFD by performance  $X_1$  and  $X_3$

Subject (designation)	Performance indicator	
	Number of foreign citizens holding a patent for labor activity (people) $X_1$	Expenses of consolidated budgets of subjects of the Russian Federation (million rubles) $X_3$
NCFD	3348,107	52886,77
A1	5012,75	93210,25
A2	1076,5	25682,08
A3	2874,75	31131,75
A4	3692	21634,73
A5	2135,25	26313,33
A6	717,75	70780,23
A7	7927,75	101455,1

As a result of the study, a number of criteria was determined, assessing the level of regional economic policy based on identifying factors (indicators) affecting GRP and evaluating their effective component. Thus, the assessment of regional economic policy with the identification of key factors affecting it, provides a more accurate economic description of the regions, allowing the executive authorities to take into account the nature of modern economic processes to make effective management decisions and assess the main trends in the development of systems, which prove the importance and validity of the proposed methodology.

## 5. Results

The significance of this study consists of criteria selection and justification which evaluate economic development of the subjects of the North Caucasus Federal District with the construction of a mathematical forecasting model.

## 6. Conclusions

A set of evaluation tools has been developed taking into account the peculiarities of the regional economic policy of the subjects of a single federal district, which can be applied in analytical and practical activities of regional executive authorities.

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